

UNITED STATES PATENT OFFICE.

SAMUEL M. CARPENTER, OF CLEVELAND, OHIO.

IMPROVEMENT IN PROCESSES OF PREPARING METAL FOR CASTINGS.

Specification forming part of Letters Patent No. **173,159**, dated February 8, 1876; application filed July 15, 1875.

To all whom it may concern:

Be it known that I, SAMUEL M. CARPENTER, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Process of Preparing Metal for Castings; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the specification.

My invention relates to a new process of preparing metal designed for chilled and other castings, yet possessing great tensile strength; and consists in adding to molten pig or cast iron, or both, scraps or pieces of steel after the molten metal is drawn from the furnace, but before the said metal is poured into the molds, the said scraps or pieces of steel being melted by the said bath without contact with blast of air, being immersed in the said bath.

I have found by experiment that the steel, as it melts under such conditions, seems immediately to permeate the entire mass of molten iron, making it homogeneous throughout its entire extent and bulk. It is well known that steel, when melted in a cupola-furnace, or in any furnace where it is subjected to the action of blast of air, oxidizes so rapidly as to cause great waste.

The object of my invention is to avoid the necessity of raising the steel to the melting-point in a cupola or other furnace where the said steel, in a molten state, would be subjected to the action of air, and I thereby preserve the steel unburnt and with little waste, and produce a molten mass that will make castings of great tensile strength, homogeneous in texture, and which is admirably adapted to all kinds of chilled castings.

My invention consists as follows: I take pig-iron, scrap cast-iron, or both, and melt them in a suitable furnace, when I run the said metal into a ladle, shanks, or other reservoir, previous to pouring it into the molds. I then throw into the said molten mass scraps of steel, such as steel turnings and other small pieces of steel. I stir this right into the molten metal. The heat thereof is sufficient to melt the said steel, and it is effected without the loss by oxidation that attends the melting

of steel in any kind of furnace where the molten steel is exposed to air, and without such reduction of temperature as to destroy the proper fluidity for making the desired castings. Instead of working small particles of steel, such as steel turnings, I may use larger pieces of steel, such as parts of steel railroad-rails, fag or butt ends, &c.

When I employ large pieces of steel the molten iron is not sufficiently hot to melt the steel and still retain the fluidity required in metal designed for chilled and other castings. I therefore heat the said large pieces of steel, but not to the melting-point. I then put the said heated pieces of steel into the molten iron before pouring, which melts them without reducing the fluidity of the mass to an extent to prevent its flowing rapidly into the molds, as required in metal designed for chilled and other castings. The result is a metal that will readily chill, and yet possess great tensile strength without any great waste of steel by oxidation, and may be employed in the construction of car-wheels, plow mold-boards, and other articles where chilled or other cast metal is employed.

When it is desired to draw the molten metal from an air-furnace directly into the molds, as is frequently done, then I add the scraps or pieces of steel to the molten metal in the furnace just before drawing the same, in the same way, and with the same purpose and effect, that it is added to the metal in the ladle, shanks, &c., after drawing, but before pouring into the molds.

The above operation of putting the steel into the furnace before drawing off into the molds can be accomplished without departing from the principle of my invention in all kinds of furnaces as, for instance, the ordinary air-furnace, where the molten metal is not subjected to a blast of air, which would act directly on steel to burn it.

The proportion of steel to molten metal will vary with the character of the molten metal, also with the character of the steel, and the use to which the casting is to be applied.

I am aware that car-wheels have been made of wrought-iron and pig-iron, or of wrought-iron, pig-iron, and steel, and also of mixed steel, low steel, or steel sponge, and cast-iron,

of about equal parts, and melted together, and therefore I do not claim, broadly, a homogeneous metal composed of cast-iron and steel; but

What I claim is—

The process of preparing metal designed for chilled or other castings, substantially as hereinbefore set forth, the same consisting in mixing scraps or pieces of steel, which may or may not have been previously heated, with molten cast or pig iron, in the manner de-

scribed, and immediately before pouring the metal, substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SAMUEL M. CARPENTER.

Witnesses:

JAMES WADE, Jr.,

JAMES T. WORLEY.